

# A SYSTEM DESIGN OVERVIEW ON FACE RECOGNITION SECURITY SYSTEM

PRAJWAL R M<sup>1</sup>, SAVITHA C<sup>2</sup>, M Z KURIAN<sup>3</sup>

<sup>1</sup> M.Tech (VLSI & EMBEDDED SYSTEM) Student, Dept of E&C, SSIT, Tumkur, India

<sup>2</sup> Asst. Prof., Dept of E&C, ECE, SSIT, Tumkur, India

<sup>3</sup> HOD, Dept of E&C, SSIT, Tumkur, India

E-mail: <sup>1</sup>prajurm2015@gmail.com, <sup>2</sup>savithac1122@gmail.com, <sup>3</sup>mzkurian@yahoo.com

**Abstract-** Nowadays, security is the essential part of systematic day to day activities. By utilizing internet of things, there is a growing attentiveness in the smart home technique. The security capacity is one of the main aspects in the smart home technique which can just lock and unlock the entryway. At present, most of the security problems are being faced at the public places such as banks, offices, shopping complexes etc. Hence, to obtain the desired security many exclusively expert workers are required. The human beings as a worker make mistakes that might influence the level of security. The face recognition security system is a recommended solution to the above-mentioned problem, which can find intruders to confined areas and human mistakes are decreasing by using this system. This system includes two types of components namely hardware component and software components. The hardware components include webcam, Arduino microcontroller, PIR sensor and LCD display. The software components include face detection and face recognition algorithm. The face recognition system is presented to take images very quickly. The webcam captures the images after any movement is detected by PIR sensor in a particular area. Subsequently, in the captured image the face is detected and recognized. Ultimately, by using IOT applications images and notifications are sent to the smart phone of an authorized person.

**Keywords -** Face recognition, Security.

## I. INRODUCTION

Nowadays, the most significant issue is the home security system. In today's life, the security factors are required in numerous regions. The significance of the security system is affected by the privacy factor also. The strong security system is developed by using the advances in electronic technology. The identification of users who will enter the room is the essential link in security chain. The IOT is one of the electronic technologies which has lot of advantages and that increase the security of people.

This method is utilizing in the homes, smart offices etc. In the IOT platform, the additional security system is provided by computer vision. Earlier, the traditional method was used by people for their home security system. The traditional security system is depending on the use of non-living things like key, ID card, password etc to get entry. The field of biometric includes the real time face recognition as a part of its. Biometrics is the capacity for a computer to recognize a human via distinctive physical properties. The face recognition gives the ability for the computer to identify a human by using features in the face. At present, one of the advanced and fastest developing field is the biometrics. The face recognition system with additional development may be applied in simultaneous systems demanding user confirmation like ATM security, home automation, attendance system etc.

## II. RELATED WORKS

In [1] N A Othman and I Aydin proposed "A new IOT combined face detection of people by using computer vision for security application". This system is implemented by using Raspberry PI3 along with PICAMERA. In this system, Haar cascade algorithm and Adaboost algorithm are used to detect the face. The main aim of this system is face detection. In [2] N A Othman and I Aydin proposed "A new IOT combined body detection of people by using computer vision for security application". This system is developed by using PIR sensor mounted on the Raspberry PI. In this system, HOG algorithm and SVM algorithm are used to detect the body. The main goal of this system is body detection. In [3] Amritha nag et al. proposed "IOT based door access control using face recognition". This system is implemented by using OpenCV based face recognition method. In this system, the Haar classifier is used to recognize the face. In [4] Moulik upala proposed "IOT solution for smart library using facial recognition". This technique forms a capacity to improve the internet of things. The main goal of this system is decreasing the manual effort.

### III. DESIGN OF FACE RECOGNITION SECURITY SYSTEM

#### A. Hardware Design

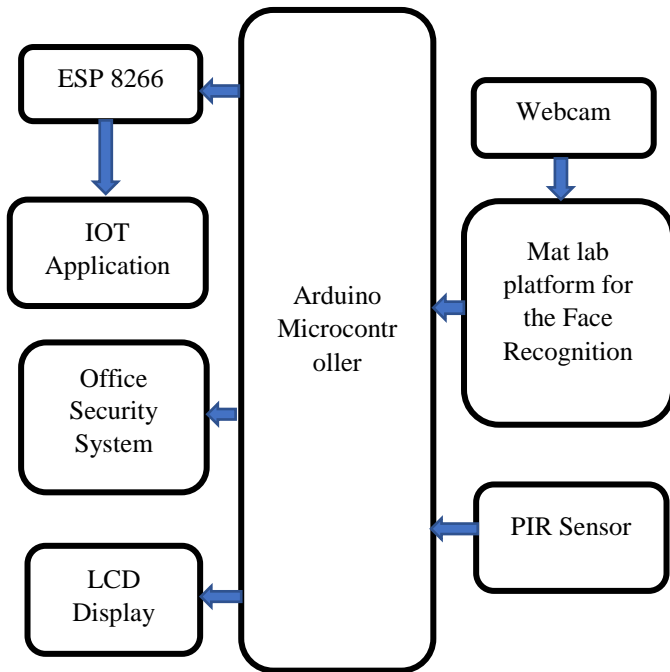


Fig1: Proposed block diagram for face recognition security system

Figure 1 shows the proposed block diagram of face recognition security system. The Arduino microcontroller is one of the main components in this system. The webcam is connected by the Arduino microcontroller. Because the motion of webcam is controlled by microcontroller. When PIR sensor detect any movement then the webcam capture images. After that the captured image is applied by the computer vision module and face is easily recognized due to its capacity. If face is recognized, the door lock is opened in the office. Then images and notifications are sent to the smart phone of an authorized person by using IOT applications. If the face is not recognized the door lock is not opened but then also by using IOT applications, the images and notifications are sent to the smart phone of an authorized person. Ultimately, the result is displayed on the LCD display.

#### B. Software Design

Figure 2 shows the flow chart of the proposed face recognition security system. If the movement is not detected by PIR sensor the process is in the beginning stage. If the movement is detected by PIR sensor the webcam is used to capture the image. Then the captured image undergoes processing. If the detected face is recognized, the door lock is opened in the office. Then the images and notifications are sent to the smart phone of an

authorized person by using IOT application. If the detected face is not recognized the door lock is not opened and the process is again starting from the first stage.

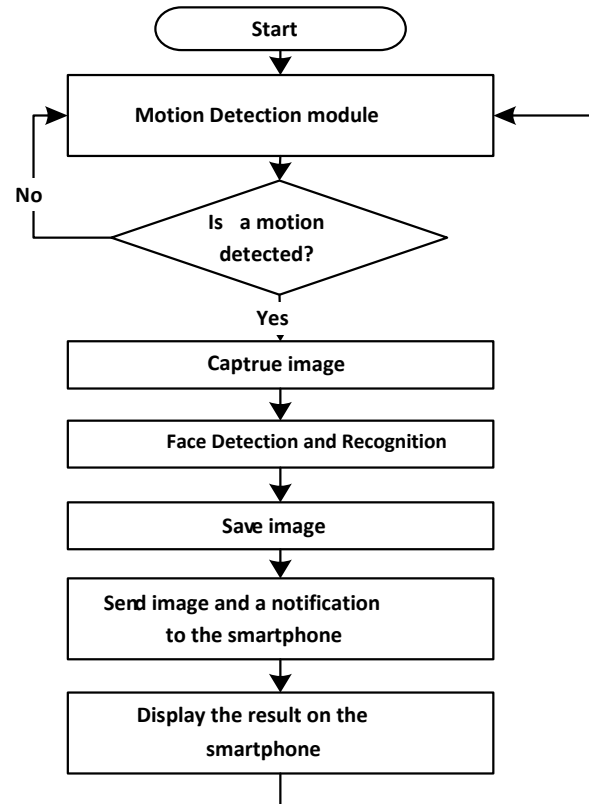


Fig2: Flowchart for Face Recognition Security system

### IV. SYSTEM REQUIREMENT

#### A. Hardware

1) **Arduino uno:** Arduino uno is a microcontroller board based on the ATmega328p. Arduino uno includes 14 digital input/output pins, 6 Analog inputs, a 16MHz quartz crystal, USP connections, power jack and a reset button. The reference versions of Arduino are uno board and 1.0 of Arduino software. The 1kB EEPROM, 2kB SRAM, 23 general purpose I/O lines, 32 general purpose working registers are some of the bits which are combined with this microcontroller. This device operates between 1.8 to 5.5 volts.

2) **PIR sensor:** The HCSR-501 is used as PIR sensor. The human and motion detections are the main purposes of using this sensor. The occurrence of human beings is sensed by this sensor because it is digital sensor. The 10 to 15 cm is the range of this sensor. The PIR sensor captures the thermal radiation which are emitted by the human body of the range 0.8 to 0.14nm and provides 1 or 0 for presence or absence of the human being.

3) **LCD display:** A liquid crystal display is a flat paneled and electronic visual display evolved from liquid crystal technology. The liquid crystal does not discharge light instantly instead they utilize modulating methods. In wide range of applications, the alphanumeric displays are utilized. The 224 various features and symbols are displaying by the 16x2 intelligent alphanumeric dot matrix display. The operating voltage of LCD display is 4.7 to 5.3 volts. It consists of two rows and 16 characters are printed by each row.

4) **Webcam:** It is a small camera used in the face recognition system for capturing image after the detection of any movement. The webcam is connected by the Arduino microcontroller. The motion of the webcam is controlled by the microcontroller.

### **B. Software**

1) **Arduino IDE:** The Arduino IDE consist of text editor for writing code, a message area, a test consoles, a toolbar with button for common functions and series of menus. To send program and communicate with them, it attached to the Arduino and Genuino hardware.

2) **IOT application:** It is an android application which is used for immediate messaging assistance. The messages, photos, video files, audio files etc. are swapping by using this application. The end-to-end encryption between the user conveying with each other is satisfied by this application and by utilizing any android devices it can be installed.

## **V. CONCLUSIONS**

The face recognition security system gives better security, when compared with other security systems. It is less expensive and very easy process. This system increases the security of homes and offices. The other biometric systems require lot of computation combined together for its performance and they use iris, fingerprint, voice to recognize a person and it takes lot of time. But the proposed security system takes short time to identify a person. So, the proposed security system is very useful and it is the finest technique for the security.

## **REFERENCES**

[1] N. A. Othman, I. Aydin, "A New IoT Combined Face Detection of People by Using Computer Vision for Security Application," in Proc. 2017 IEEE International Conference on Artificial Intelligence and Data Processing (IDAP17), pp. 1-5.

[2] N. A. Othman, I. Aydin, "A New IoT Combined Body Detection of People by Using Computer Vision for Security Application," in Proc. 2017 IEEE International Conference on Computational Intelligence and Communication Networks (CICN 2017), pp.1-5.

[3] Amritha Nag, Nikhilendra J N, Mrutyunjay Kalmath, "IoT based door access control using face recognition", 2018 3rd International Conference for Convergence in Technology.

[4] Maulik Upala, WK Wong, "IoT Solution for Smart Library Using Facial Recognition", IOP Conf. Materials science and Engineering 495(2019).

[5] Shrutika V. Deshmukh, Dr.U.A.Kshirsagar, "Implementation of Human Face Detection System for Door Security using Raspberry Pi", International journal of innovation Research in Eleectrical, Electronics, Instrumentation and control Engineering.